Data

Crankshaft standard dimension and repair stages	Crankshaft bearing journal dia.	Width of journal at fitted bearing	Crankpin dia.	Width of pins
Standard dimension	69.96 69.95	34.00 34.03	51.96 51.95	32.00 32.10
1st repair stage	69.71 69.70	up to 34.60	51.71 51.70	up to 32.30
2nd repair stage	69.46 69.45		51.46 51.45	
3rd repair stage	69.21 69.20		51.21 51.20	
4th repair stage	68.96 68.95		50.96 50.95	

Permissible out-of-round of crankshaft journals and crankpins		0.005
Permissible conicity of crankshaft journals and crankpins		0.01
Permissible radial runout of flywheel flange		0.02
Permissible axial runout of fitted bearing		0.02
Fillets on crankshaft journals and crankpins		3 to 32.30
Permissible radial runout of crankshaft journals when mounted at outer journals	Journal II, IV	0.07
	Journal III	0.10
Scleroscope hardness of crankshaft journals and crankpins	When new	74–84
	Limit	60[1)]
Permissible unbalance of crankshaft		15 cmg

1) The limit value should be available at least at 2/3 of journal and crankpin circumference.

Special tool

Impact hardness tester		000 589 20 21 00

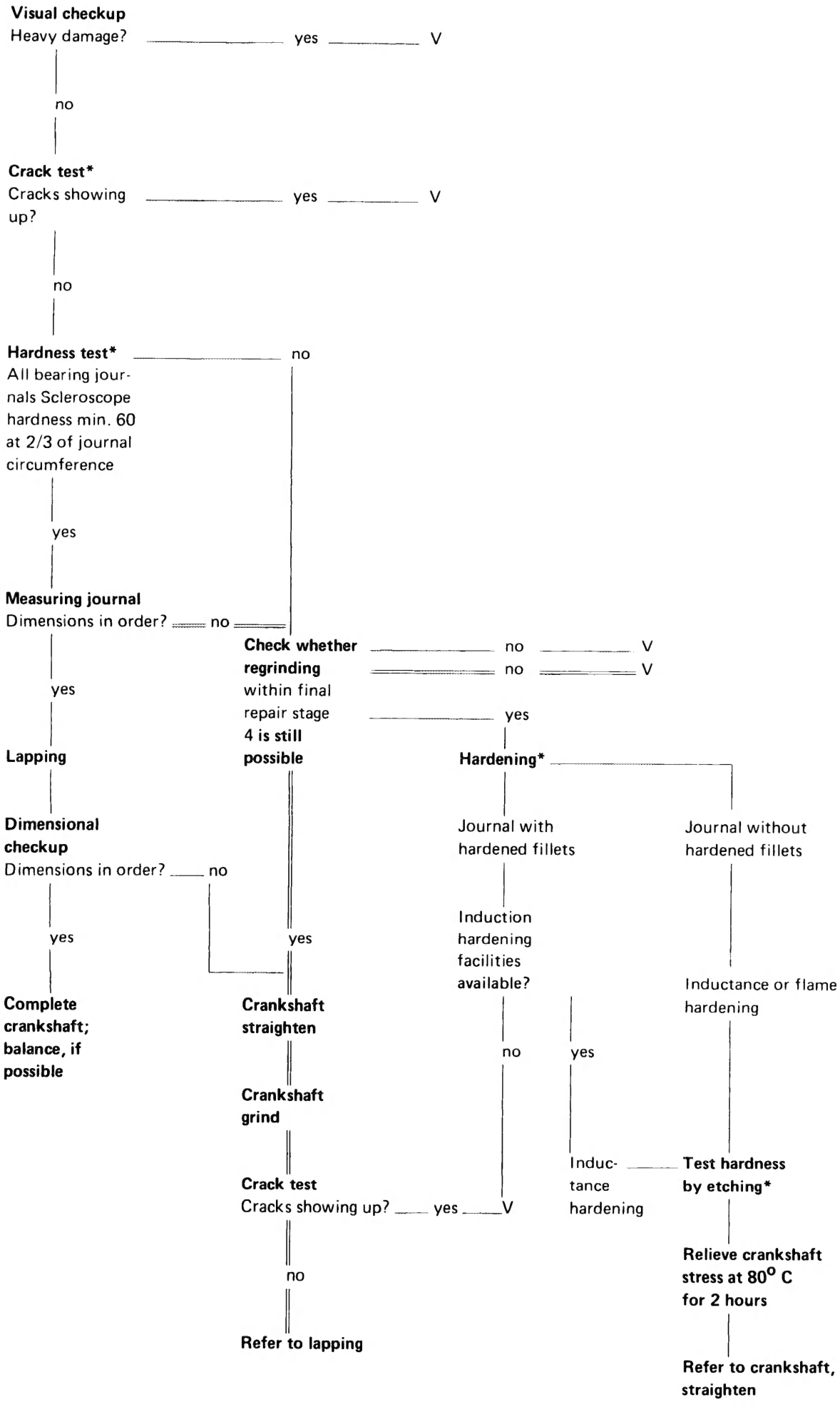
Note

When checking and reconditioning crankshaft, proceed in sequence of diagram below.

Diagram

* Refer to section "Explanations concerning diagramm".

V = Scrap


Visual checkup
Heavy damage?
yes
V
no
Crack test*
Cracks showing up?
yes
V
no
Hardness test*
All bearing journals Scleroscope hardness min. 60 at 2/3 of journal circumference
no
yes
Measuring journal
Dimensions in order?
no
yes
Lapping
Dimensional checkup
Dimensions in order?
no
yes
Complete crankshaft; balance, if possible
Check whether regrinding within final repair stage 4 is still possible
no
V
no
V
yes
yes
Crankshaft straighten
Crankshaft grind
Crack test
Cracks showing up?
yes
V
no
Refer to lapping
Hardening*
Journal with hardened fillets
Induction hardening facilities available?
no
yes
Induc-tance hardening
Journal without hardened fillets
Inductance or flame hardening
Test hardness by etching*
Relieve crankshaft stress at 80° C for 2 hours
Refer to crankshaft, straighten

Explanations concerning diagram

Crack test

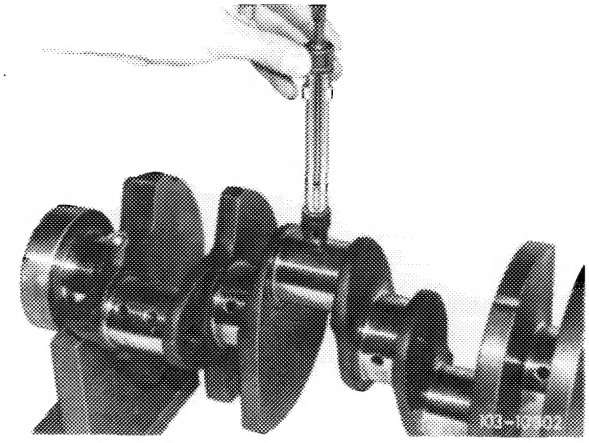
Clean crankshaft. Bearing journals should be free of oil and grease. Magnetize crankshaft and apply fluorescent powder (fluxing). A color penetration test (immersion in bath or using spray can) may also be applied.

Aids: Paint or fluorescent powder, cleaning agent, developer.

Hardness test

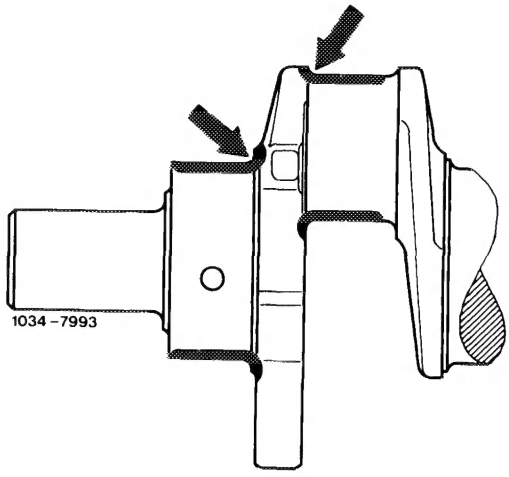
Check hardness with impact hardness tester (scleroscope hardness).

A minimum hardness of 60 should prevail at 2/3 of journal circumference.

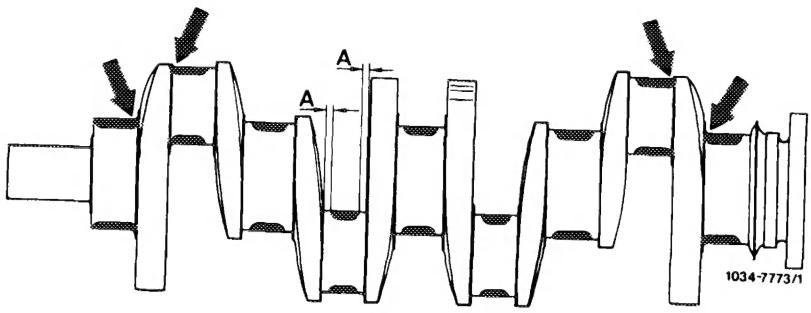


Hardening

Journals without hardened fillets can be inductance hardened or flame hardened. Journals with hardened fillets (arrows) should be inductance hardened on principle. If this is not possible scrap crankshaft.



When hardening journals without hardened fillets the distance "A" between runout of hardened surface and fillet (5–6 mm) must be maintained.



Checking the hardening

For perfect hardening, check adjustment of hardening equipment by metallographic grinding.

Pertinent tests can be made on scrapped crankshafts.

Check hardening by etching the journal surface with a 2% alcoholic nitric acid (HNO_3) solution.

No dark spots should show up at surface of journal.

Non-hardened fillets will become dark.

The hardened fillets, on the other hand should be as bright as the journal surface.

For comparison, we recommend an etching test on a metallographically inspected journal.

Then, carefully wash off nitric acid by means of alcohol.

Corrosion protection

Coat crankshafts which are not immediately installed again with engine initial operation oil (SAE 30).